DOCUMENT RESUME

ED 022 553 PS 001 241

By-Hess, Robert D.; Shipman, Virginia C.

HEAD START EVALUATION AND RESEARCH CENTER, THE UNIVERSITY OF CHICAGO. REPORT D, THE INTERACTION OF INTELLIGENCE AND BEHAVIOR AS ONE PREDICTOR OF EARLY SCHOOL ACHIEVEMENT IN WORKING CLASS AND CULTURALLY DISADVANTAGED HEAD START CHILDREN.

Chicago Univ., Ill. Head Start Evaluation and Research Center.

Spons Agency-Institute for Educational Development, New York, N.Y.; Office of Economic Opportunity, Washington, D.C.

Report No-OEO-1410

Pub Date 30 Nov 67

Note-50p.

EDRS Price MF-$0.25 HC-$2.08

Descriptors-*ACADEMIC ACHIEVEMENT, *ANNUAL REPORTS, *BEHAVIOR PATTERNS, BEHAVIOR RATING SCALES, CULTURALLY DISADVANTAGED, FACTOR ANALYSIS, *INTELLIGENCE, INTELLIGENCE TESTS, *INTERACTION, PREDICTIVE ABILITY (TESTING), PRESCHOOL CHILDREN, TEACHER RATING

Identifiers-Head Start, Preschool Inventory, *Probable Adaptation (Behavior Rating Scale), Stanford Binet

This study seeks to determine the degree to which certain behavioral measures interact with intelligence, whether in a linear or curvilinear fashion, to help one predict academic achievement in Head Start children to a greater degree than would be possible were intelligence test performance alone used as the predictor variable. Children were tested during a summer Head Start program and retested in the fall in a followup study. Of the tests of ability used with the children, the two best predictors of success in the academic tasks in kindergarten was the Preschool Inventory and the Stanford-Binet. The best predictor of socially conforming behavior was the Probable Adaptation rating made by teachers. The behavior and possibilities for future progress of the children were rated at the end of the summer session and during the followup. An initial hypothesis, that differences in behavior level would affect success criteria scores in low IQ children more than it would in high IQ children, was generally not supported. In addition, no striking curvilinear interaction was found between behavior level and intelligence, but the majority of success criteria appear to interact in a linear fashion across behavior areas. (WD)

U. S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION



THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

D. The Interaction of Intelligence and Behavior as One Predictor of Early School Achievement in Working Class and Culturally Disadvantaged Head Start Children

Principal Investigators: Robert D. Hess and Virginia C. Shipman
Project Director: Ethel Hull

1. Problem

Intelligence test scores, though impressive in the degree to which they alone predict academic achievement as compared with the predictive power of other single variables (Hinkleman, 1955; Kennedy, Van De Riet, & White, 1963; Knief & Stroud, 1959), gain increased and significant predictive power when observed in interaction with other relevant variables. Torney, Hull, and Hess (1967), for example, using the same research population on which this study is based, found significant increases in multiple correlations when Stanford-Binet I.Q. scores were paired with teacher ratings of probable school achievement and adaptation in predicting scores on the Metropolitan Reading Readiness Test for a lower class Head Start population. Terman and Oden's (1947) followup on their original sample of gifted children illustrated the importance of socio-economic factors on later success, and numerous studies on over- and underachievement and on achievement motivation have added weight to the position that ability alone does not insure academic success (Lavin, 1965; Rosen, 1956; Thorndike, 1963).

This study seeks to determine the degree to which certain behavioral measures interact with intelligence, whether in a linear or curvilinear fashion, to help one predict academic achievement in Head Start children to a greater degree than would be possible were intelligence test performance alone used as the predictor variable.

ED022553
PS001241

The possibility of curvilinear rather than linear interactions has been suggested by Lavin (1965) and McClelland (1958). These investigators have hypothesized that there may be factors operating in a curvilinear fashion which, when considered together with ability level, may aid in the prediction of academic performance; Lavin suggests that these variables may be behavioral or motivational dispositions.

If the influence is a linear one, it is hypothesized that level of behavioral adjustment should have little effect on performance on achievement tests in a group of children with high intelligence test scores, but should have significant effects on the performance of children with low intelligence test scores. One might say that a child who has a level of intelligence below a certain threshold can only succeed academically if his motivation level is high; he has to want to succeed and must work harder than a bright child to keep up with the level of the class. If this child has behavioral problems, he cannot do well, whereas a brighter child can, for example, not pay attention in class and still do well because of the ability factor.

If the influence proves to operate a curvilinear fashion, then within either the high or the low I.Q. groups, a median level of behavioral adjustment should be predictive of optimal performance within that I.Q. group, whereas the extremes in behavior level should not. Again, differences in behavioral level within the low I.Q. group are expected to be greater and more often significant than those within the high I.Q. group, though perhaps to a lesser degree than with the linear model.

2. Method

Each of the hypotheses described above has been tested on two groups of Head Start children. One group was composed entirely of children from lower class homes. This group was divided by median split into high or low Stanford-Binet intelligence levels. Within each I.Q. level, further subdivisions were made; using a three-way split, children were categorized as having high, medium, or low levels on each of four Behavior Inventory Summary Areas (Aggression, Verbal-Social Participation, Independence, and Achievement-Oriented Behavior). Then, for each of these subgroups considered separately, performance on a number of achievement tests was examined, and, within each I.Q. group, differences in achievement across the behavior levels for each summary area were tested for significant interactions.

The second group of subjects differed from the first primarily in that a number of high I.Q., middle class children enrolled in the Head Start program were included in the original sample. Here, when dividing subjects into high or low I.Q. groups, median splits were not made, but rather approximately one standard deviation above national intelligence test norms was used as the baseline or starting point for the high I.Q. group, and approximately one standard deviation below national intelligence test norms was used as the baseline for the low I.Q. group. It was deemed necessary to test the original hypothesis on this second group of children because of the lack of comparability in range of intelligence test scores between the lower class group and national norms. The exact procedure followed in testing these hypotheses is described below.

a. Description of the Research Population

The data reported here come primarily from one of four Head Start centers evaluated in the summer and fall of 1965. Children from one center (Center A) participated in a followup testing program during part of their first year in school, following their summer Head Start experience; it is this group of children with which this study is primarily concerned. As certain analyses were conducted using data from two of the centers (Centers A and B), however, some data for Center A alone is not available. Whenever possible, data gathered only from Center A will be presented.

Center A served a population of 126 Negro and 26 white children who lived in a predominantly middle to upper middle class suburb of Chicago. The large majority of the children enrolled in the program were working class, however. The program was held in an elementary school building which had a full range of nursery and kindergarten equipment. Each class of fifteen was staffed by a teacher and an assistant teacher and two or three volunteers. The teaching staff were all professional nursery school, kindergarten, or first grade teachers. They had a mean of 9.5 years of teaching experience, and all but one of the ten had had more than one year of teaching experience. Volunteers were housewives from the community (some with teaching experience) and high school students, also from the community.

Center B served a population of 104 Negro children from a central city slum area in Chicago. The program was housed in a small four room "community house" adjacent to a church. There was a minimum of play equipment. The playground consisted of a grassy

lot with two trees for climbing. In Center B there were two teachers for each group of thirteen and an occasional teen-age volunteer. The teachers here had had a mean of 3.5 years of teaching experience; fewer of them had taught nursery school or kindergarten children. A larger percentage of them had had previous experience with disadvantaged children, however.

In addition to the testing of children during the Head Start program, a selection of instruments used in the summer were readministered to a sub-group in the kindergarten classrooms in which the children were enrolled in the fall. This fall retest took place only in Center A where the concentration of post-Head Start children in three schools as well as the cooperation of school officials made a followup study practical. The scores on a nationally standardized test of reading and number readiness given in the spring, as well as the child's grade from his fall semester report card were also gathered from the school records.

Although Head Start is intended to be primarily for children from backgrounds of low social status, in each center there were a proportion of children who were from middle class, not working class homes. The majority of analysis in this study includes the children from working class backgrounds. This included children from homes where the head of the household was a laborer, domestic servant, skilled or semi-skilled manual worker or service worker. It also included those where the family receives public assistance.

b. Instruments Used in the Study

1) Measures of Cognitive Ability

A primary goal of the research project on which this study is based was to recommend a set of instruments for use with working

PS001241

class children which could be used to predict their subsequent school achievement, to evaluate school readiness, and to assess areas of special disability. A variety of cognitive assessments were employed, including some standardized tests, some instruments pilot-tested by other investigators, and other tests developed especially for the project.

Described below are only those instruments having greatest relevance to this study; for a description of all instruments used in the original project, see Hess, Kramer, Slaughter, Torney, Berry, and Hull (1966).

The intelligence of an elementary school child, particularly as measured by the Stanford-Binet, has been the single most widely used assessment of intellectual ability (Stott & Ball, 1965; Sundberg, 1960). The Stanford-Binet, Form L-M, was administered by trained testers once during the summer period. The mean I.Q. of the total group of working class Head Start children tested was 90.78, with a standard deviation of 14.51 (N = 187, Center A and B); for Center A alone the median I.Q. was 89. The stanford-Binet was significantly correlated (P = .02 or better) with every other cognitive test. Its highest correlation was with the Preschool Inventory administered in the summer ($\underline{r}$ = .79; N = 106).

The Preschool Inventory was designed by Caldwell (1965) specifically for Head Start. In this test, the child is asked his name, address, and the names of his classmates. His grasp of concepts of color, time, and ordination is tested as is his ability to follow instructions. The entire set of 152 items (preliminary form) was administered to the Head Start group in both Centers A

and B during the third week of the program. As a result of complaints by teachers and testers that the Preschool Inventory was too bulky an instrument to be administered effectively, or to sustain the child's attention, it was decided to shorten the instrument for the retest program planned for the fall (at this time the revision of items subsequently prepared by Caldwell and Soule, 1966, was not available).

The percentage of children who had passed an item was the major piece of information used to select items. It was decided in the Partial Item Set items from all sections of the original instrument where the initial percentage of children passing was low enough to allow for future change, as well as a number of high-percentage-pass items so that less achieving children would not be discouraged by a series, none of which they could answer. Forty-nine items were included in the revised instrument, and were administered in the fall retesting. In order to obtain comparable scores for summer and fall testing, a score was given the child based on the Partial Item Set of 49 as he had answered them during the summer. The correlation of this Partial Item Set (summer), scoring only 49 items, with the Total Summer Score, scoring all 152 items, was .95. A part-whole correlation of this magnitude suggests that the results reported here with this set of items are probably highly similar to those of other investigators who use the revised Preschool Inventory items recently copyrighted by Caldwell and Soule (1966).

The correlation between the summer and fall testing using the Partial Item Set was .80. Information and achievement at the preschool level are highly consistent even across a four month period.

From the correlation of both administrations of the Preschool Inventory with the Binet (.79 and .68) it appears that the distinction in test content between achievement and intelligence tests is not clear-cut. The Binet in fact uses a large number of information questions in assessing intelligence and is probably more precisely referred to as generalized achievement test. The Preschool Inventory scores are significantly correlated with chronological age, as would be expected for a test which is not normed to give an I.Q. score.

2) Behavioral Measures

Cooperativeness with other children, the ability to talk about one's experiences, interest in listening to others, the ability to play without constant adult supervision, and energetic interest in new objects and experiences are among the social and emotional characteristics which foster adjustment and achievement in the early elementary school years. This study of Head Start attempted to assess these social and emotional characteristics by these types of rating instruments administered to testers, teachers and observers during the summer program, and to teachers and testers during the fall retest program. The three rating instruments were the Behavior Inventory, the Readiness Checklist, and the Fact Sheet of the Stanford Binet Intelligence Scale, Form L-M. The Behavior Inventory was designed by Dr. Edward Zigler for the Office of Economic Opportunity to be used on a nation-wide basis; the Readiness Checklist was designed at the Urban Child Center. As results of analysis of the Face Sheet of the Stanford Binet are not included in this report, a description of analysis concerning this instrument can be found in Hess, et. al. (1966).

The Readiness Checklist in its original form consisted of twelve items oriented toward readiness for and future progress in school. Children were rated by teachers, at the conclusion of the summer Head Start program, on perceived Readiness for Kindergarten. This rating was made on a five-point scale.

Two additional ratings (here on a seven-point scale) were then made by both teachers and observers for each child's probable Adaptation and Achievement during the early school years. Administration to both teachers and observers included children from Centers A and B. All items from this instrument were included in the fall retest sample of children from Center A.

When one examines inter-rater reliability, product moment correlations based only on working class children from Center A between teacher and observer ratings of Probable School Achievement and Adaptation were moderate though significant at better than the .01 level ($\underline{r}$ = .484, N = 86 for teacher vs. observer Achievement ratings; $\underline{r}$ = .535, N = 89 for teacher vs. observer Adaptation ratings).

The Behavior Inventory, originally a fifty-item instrument, was designed to measure certain behavioral and emotional tendencies ranging from verbal participation, social interaction and aggression to general dispositional states. Each child was rated for each item on a seven-point scale; numerically low ratings indicate similarity to or possession of the attribute in question, numerically high ratings indicate dissimilarity. The original instrument was administered four times, once to teachers and once to observers at the onset of the Head Start program, and again to both teachers and observers during the eighth week of the program. The teachers' and observers' initial administrations and the teachers' second adminis-

tration of the instrument included children from Centers A and B; the second observers' administration included a partial sample of children from Center A only. During the retest program, a condensed version of the instrument was administered to teachers in Center A.

As the original Behavior Inventory as sent out by the Office of Economic Opportunity required that items be rated on a four-point scale, 136 protocols of this version of the instrument were administered to teachers at the onset and at the conclusion of the summer program. As the research staff felt that this scale did not allow for sufficient discrimination, a seven-point rating was constructed and was applied to every child who was rated. The correlations between the application of the four-point and the seven-point scales to the same child for the same administration ranged from .70 to .94 (N ranged from 132 to 136), for the fifty scales used in the total Behavior Inventory. The items as rated on the seven-point scale were used in all reported analysis because the most extensive data had been collected using this item format. Although it is impossible to determine what results would have been obtained if the four-point scale had been used, it is likely that the results would have been highly similar to those reported here.

As many of the instruments administered during the summer Head Start program were lengthy and difficult to administer efficiently, instrument reduction was both necessary and desirable. On the basis of preliminary factor analyses of the fifty-item Behavior Inventory, twenty-three items were chosen for followup testing during the autumn following the Head Start summer. The major criterion for including an item in the retest was its high loading on one of the rotated factors.

A more complete factor analysis including all observations (N = 769) made by teachers and observers during the summer testings in both centers was conducted using only these twenty-three selected items, for the purpose of determining summary areas to compute subscores and reduce the number of items for analysis. Six factors were extracted using a Principal Component Analysis. For the first five factors, the four items with the highest loadings were selected and ratings were averaged to form five summary scores: Aggression, Verbal-Social Participation, Timidity, Independence, and Achievement-Oriented Behavior[1].

As summary scores based on Center A working class children (initial summer ratings by teachers) were to be used as the major behavioral criteria for this study, a factor analysis of these data alone was performed to insure and confirm the stability of the factors found for the entire sample. In this analysis, no Timidity factor was obtained, although the remaining four factors were either highly similar to or identical with those extracted from the total sample analysis.

Only the four summary scores, Aggression, Verbal-Social Participation, Independence, and Achievement-Oriented Behavior, which emerged as factors both for the total sample analysis and for Center A analysis were used in this study.

---

1. These suggested summary scores are not factor scores in the true sense because items included were not weighted by their loadings on the factor (although the item which was loaded negatively on the third factor was reversed in scoring).

Inter-rater reliability (teachers' vs. observers' initial administrations) was high to moderately low, although all correlations were significant at p = .01 or better. Inter-rater reliability was highest for the summary areas of Aggression ($\underline{r}$ = .637, N = 116) and Verbal-Social Participation ($\underline{r}$ = .657, N = 118), but was low for the areas of Independence ($\underline{r}$ = .308, N = 118) and Achievement-Oriented Behavior ($\underline{r}$ = .413, N = 116). It is evident from the above that some item clusters are more reliable in this respect than others. The less reliable clusters may reflect a certain ambiguity in the working of the "independent" or "achieving" behaviors. In measuring autonomous achievement strivings in nursery school children as rated by different teachers at different points in time, Beller (1957) obtained correlations ranging from .67 to .80 with an N of 52. Also, Crandall and Sinkeldam (1964) obtained inter-rater reliability coefficients ranging from .71 to .88 (N = 24) on items measuring achieving behaviors in a sample of school-age children ranging in age from just under seven to twelve and one-half years. The higher correlations found in these studies possibly support the hypothesis that items in the Behavior Inventory Summary Score of Achievement-Oriented Behavior are to some extent ambiguous and in need of clarification.

Other investigators, however, have also found lower inter-rater reliability correlation coefficients for items measuring independence than for items measuring other, more clearly defined behaviors, suggesting that independence presents a general problem in measurement. Emmerich (1966), for example, obtained inter-rater reliability coefficients ranging from .51 to .63 (N = 53) on measures of

aggressive behavior in nursery school children, while his reliability coefficients for items measuring independent behavior in the sample ranged from .43 to .47.

Product-moment correlations of Behavior Inventory Summary Scores (Teachers, first administration) with each other ranged widely in magnitude. Achievement-Oriented Behavior was the only summary score showing significant interactions with every other summary area ($r$ ranged from .39 to .52); Verbal-Social Participation, though interacting significantly with Achievement ($r$ = .48), showed approximately zero with either Aggression or independence. Aggression interacted significantly and negatively with independence and Achievement ($N$ = -.42 and -.39, respectively), but had an approximately zero correlation with Verbal-Social Participation.

These interaction patterns suggest that, while Achievement-Oriented Behavior relates to each of the remaining three Behavior Inventory summary areas, it does so in different ways, as level of either Aggression, Verbal-Social Participation or Independence is in only one case (Aggression vs. Independence) predictive of performance on summary areas other than Achievement. The major area of overlap, then, among the four summary areas is seen in the relationship of Achievement-Oriented Behavior to the three remaining summary areas and generally not within the three remaining areas themselves. The summary areas of Aggression, Verbal-Social Participation and Independence are, in this study, relatively independent of each other and appear to tap relatively distinct areas of behavior.

Of the four Behavior Inventory Summary Scores, product-moment correlations indicate that Aggression is the one behavior area showing little interaction with cognitive measures (See Table 1). Verbal-Social Participation, Independence, and Achievement-Oriented Behavior interacted significantly though moderately with the Stanford Binet, the Draw-A-Man, and both initial and retest administrations of the Preschool Inventory, Partial Set.

Although three of the four behavioral correlations (Teachers' initial administration of the Behavior Inventory) with Stanford Binet I.Q. were statistically significant, the highest proportion of variance accounted for in any one of these correlations was .10. It is felt, therefore, that while Behavior Inventory Summary Scores are to some extent confounded with intelligence test scores, this effect is too small to present major problems in testing the central hypothesis examined in this study.

TABLE 1
RELATIONSHIPS BETWEEN BEHAVIOR INVENTORY SUMMARY SCORES AND COGNITIVE MEASURES+

| BEHAVIOR INVENTORY SUM. SCORES | STANFORD-BINET IQ (FORM LM) | D-A-M WK 4 | PRESCHOOL INVENTORY PARTIAL SET PRETEST | RETEST |
|---|---|---|---|---|
| Aggression | -.134 (116) | -.057 (118) | -.279** (108) | -.197 (90) |
| Verbal-Social Participation | .310** (117) | .250* (118) | .349** (108) | .360** (90) |
| Independence | .222 (117) | .192 (119) | .372** (108) | .337** (90) |
| Achievement-Oriented Behavior | .269** (115) | .272** (117) | .474** (106) | .518** (88) |

+Correlations based on teachers' ratings of working class Center A children only. D-A-M = Draw-A-Man I.Q.
*p = ≤ .05; ** p = ≤ .01.
a.Signs have been changed in a number of correlations in this table so that high scores indicate a high amount of the quality named.

3) Measures of School Achievement

The major criteria for assessing the child's success in kindergarten were scores on the Metropolitan Test of Reading and Number Readiness, scaled into percentiles, and the children's grades on report cards at the end of the fall semester. All of these tests and assessments were conducted as part of the school system's regular program; these were not ratings made for research purposes, but rather were ratings of children's progress which the teachers sent home to parents and made a permanent part of the school record. The report cards used by this school system are similar to those used to report progress in kindergarten and the early grades in many school systems, including not only progress in achievement tasks, but also various types of social cooperation, discipline, and responsibility that are important in the kindergarten classroom.

Because there were twenty-seven separate ratings, each on a three-point scale, on these report cards, the data were factor analyzed to suggest item combinations which could be used to reduce the number of separate criteria of school success. A Principal Component Analysis with Varimax Rotation of these items was conducted using the population of 84 Head Start children from Center A. Six factors were extracted. Five of these clusters of items were used as the basis for scoring Summary Scores. The first included four items, such as "recognizes numerals", and "interprets the meaning of pictures" and is called the Performance of School Tasks. These are ratings which the report card grouped under Number and Reading Readiness. The second factor includes four items which we called Social Conformity; it includes items such as "respects the rights, opinions, and property of

others" and "is kind, polite and thoughtful", ratings which the report card grouped under Social and Emotional Growth. The third score includes five items such as "has good self control" and "accepts and carries out responsibility". This we called the Responsibility score. The fourth score was called Verbal Assertion and Participation, and included five items; e.g., "contributes to discussion and planning" and "is curious about the world around him". The fifth score included five items, e.g., "experiments with creative material" and "plans and works independently"; this was called the Independence score.[2] Although the item selection was based upon a factor analysis, these scores are not factor scores. Each Summary Score was the mean of the ratings for the items with the highest loadings on the factor. These items were not weighted according to their factor loadings.

## 3. Results

### a. Single Predictors of School Achievement from Information Gathered During Summer Head Start

The correlation of the Metropolitan Reading Readiness standardized test with Teachers' Report Card rating of Performance of School Tasks was .803. Because of this high correlation of the two criteria, they are grouped in the following analysis. In considering the Report Card Summary Scores, it is important to note that these scores were all correlated significantly with each other. This is one disadvantage of using simple summed scores, not factor scores (which by design are independent of each other). The one Report Card Summary Score which was

---

[2]One additional report card summary score was computed for items dealing with Health. Results of analysis with this score are included in Hess, et al. (1966).

not highly correlated with the others was Social Conformity. Since there is such a high degree of commonality among our criteria, this discussion will be divided into three parts: Prediction of Reading Readiness Standardized Test Score and prediction of Report Card Summary Area of Performance on School Tasks; Prediction of Socially Conforming behavior; Prediction of Responsibility, Verbal Assertion, and Independence. Table 2 in the Appendix summarizes the statistical findings.

1) Predicting Reading Readiness

The best predictors of success in the academic tasks in kindergarten, measured either by score on the Reading Readiness test or by teachers' ratings of the Performance of School Tasks, was the Preschool Inventory (initial summer administration, Partial Set Score), with correlations of .69 and .75 respectively, and the Stanford Binet, with correlations of .68 and .69. Draw-A-Man I.Q. was correlated significantly with the two measures of school success, but at a considerable lower level ($r$ = .40 in both cases).

The second-best predictors of this type of school achievement were specific ratings by either Head Start teachers or observers of how well the child would probably achieve or adapt in kindergarten. These correlations were all significant and ranged from .39 to .61. There was no consistent tendency for either teachers or observers to be consistently superior in making this type of prediction. These items all came from items in instruments such as the Behavior Inventory in being directly oriented to prediction of school success.

The third group of variables which predicted Reading Readiness and the Report Card Summary Area of Performance of School Tasks were

the Summary Scores from the Behavior Inventory, administered to both teachers and observers. When these scores were used as single predictors, the correlations for teachers were about equal to or slightly better than those for observers. The correlations with school achievement were highest for the Summary Area of Achievement-Oriented Behavior and lowest for the Summary Areas of Aggression and Independence.

Because teachers were asked to make these ratings on all children both in the first few weeks of Head Start and again at the end of the program, it was possible to compare the accuracy of prediction of school success at these two periods. The correlations for a given Summary Score with School Performance for Time 1 and Time 2 were almost identical. In only one case was a correlation significant at a later time period and insignificant at the earlier time. This suggests that teachers do not need to have extensive experience with children in Head Start in order to make moderately accurate predictions of their success in kindergarten; more precisely, additional weeks of experience do not appear to significantly improve their ability to predict achievement.

In summary, the best predictors of kindergarten task-achievement for this sample were some measures of the child's intelligence or achievement and the ratings by his Head Start teacher or observer of how well they expected him to achieve or adapt in kindergarten.

2) Prediction of Socially Conforming Behavior

This variable is handled separately from the remainder because it has substantially lower correlations with other Report Card Summary Scores and lower correlations with predictor variables as well. Its best predictor ($r$ = .36) was the Probable Adaptation rating made

by teachers. Its next best predictors were the Stanford-Binet I.Q. ($\underline{r}$ = .34), the Preschool Inventory ($\underline{r}$ = .32), Behavior Inventory ratings by both teachers and observers on Aggression and Achievement-Oriented Behavior, and the remaining teacher and observer ratings on Probable School Adaptation and Achievement. Other variables showed similar patterns of prediction to those reported in the previous section, but all the correlations were appreciably lower. This is apparently a characteristic which is difficult to predict from observation during a summer Head Start program.

3) Prediction of Report Card Summary Scores on Responsibility, Verbal Assertion, and Independence

For these variables also, the best predictors were the cognitive tests of intelligence and achievement. Correlations with the Stanford-Binet and Preschool Inventory ranged from .51 to .71. The Draw-A-Man I.Q. was predictive here at a slightly higher level than was the case in previous sections.

Moving to the teachers and observers, ratings of Adaptation and Achievement were significant predictors (correlations ranged from .31 to .58), with some sizeable correlations between Behavior Inventory Summary Scores and these less academic types of kindergarten success. Aggression, rated by Head Start teachers and observers, showed moderately high negative correlations with the Responsibility Summary Score, while the Report Card Score on Verbal Assertion could be predicted with some accuracy by Head Start Behavior Inventory ratings of high Verbal-Social Participation and high Achievement-Oriented Behavior.

b. Interaction of Behavior and Intelligence in the Prediction of Academic Achievement

As briefly described in the Introduction to this report, the

hypotheses under consideration involved the extent to which each of four Behavior Inventory Summary Areas interacted with intelligence, whether in a linear or curvilinear fashion, to aid in the prediction of academic achievement to a greater degree than would the use of intelligence test performance alone.

When the question of possible contributions by behavior areas to the prediction of academic achievement was first considered, it was decided to obtain multiple regression coefficients on these four variables in interaction with intelligence, using as dependent variables scores on the Metropolitan Reading Readiness Test and the four Report Card Summary Areas that then seemed to be the most useful ones (i.e., Performance on School Tasks, Responsibility, Verbal Assertion, and Independence). Results obtained proved inconclusive; for only two of the four Behavior Inventory Summary Scores did multiple correlations represent significant increments over the simple correlations (see Table 3).

The Binet, as has been shown, is highly correlated with Reading Readiness, Performance on School Tasks, Verbal Assertion, Responsibility, and Independence, with correlations ranging from .55 to .72. Multiple correlations using one Behavior Inventory Summary Score (Aggression), in addition to the intellective variable, significantly raised the predictability of the Report Card Summary Area of Responsibility, and the Behavior Inventory Summary Score of Verbal-Social Participation, in addition to the I.Q. score significantly raised the predictability of the Report Card Summary Score of Verbal Assertion. In no other case did Behavior Inventory Summary Scores add significantly to the predictive power of the Stanford-Binet.

Table 3

Predicting Five Criteria of Success in Kindergarten using Stanford-Binet I.Q. Scores and Behavior Inventory Ratings by Head Start Teachers

| Criteria Predicted | N | Simple Correlations: Binet I.Q. | Multiple Correlations: Binet/ Agg. | Binet/ Agg./verb. | Binet/Agg./ verb./Ind. | Binet/Agg, verb./Ind./Ach. |
|---|---|---|---|---|---|---|
| Reading Readiness | 81 | .724 | .732 | .735 | .738 | .738 |
| School Performance | 55 | .726 | .727 | .728 | .732 | .734 |
| Verbal Assertion | 55 | .717 | .719 | .746*[a] | .762*[a] | .762 |
| Responsibility | 55 | .549 | .611*[b] | .614*[b] | .619* | --- |
| Independence | 55 | .671 | .674 | .675 | .699 | .700 |

* indicates an increase in the multiple correlation, significant at $p < .05$.

Predictor Variables are: Stanford-Binet I.Q., Form L-M; Behavior Inventory Ratings on Aggression, Verbal-Social Participation, Independence, and Achievement-Oriented Behavior.

Criteria of Success are: Percentile Score on the Metropolitan Test of Reading and Number Readiness; Report Card Summary Scores on School Performance, Verbal Assertion, Responsibility, and Independence.

[a] Significant contribution made only by the addition of the Behavior Inventory Summary Score of Verbal-Social Participation; other Behavior Inventory Summary Scores did not contribute significantly.

[b] Significant contribution made only by the addition of the Behavior Inventory Summary Score of Aggression; other Behavior Inventory Summary Scores did not contribute significantly.

It was then decided to divide the sample into high and low intelligence groups and to compare, within each group, the differences in predictability of achievement variables across levels of behavior for each of the four Behavior Inventory Summary Scores, looking for either linear or curvilinear interactions. As stated earlier, if the interaction is a linear one and if our hypothesis is correct, then level of behavior adjustment should have little effect on performance on achievement tests in a group of high I.Q. children, but should have significant effects on the performance of low I.Q. children, due to the ability factor operating in the case of the high I.Q. child. If the interaction is a curvilinear one, then within either the high or the low intelligence groups, a median level of behavioral adjustment should be predictive of optimal performance within that I.Q. group, whereas the extremes in behavior level should not.

Each of the hypotheses described above has been tested on two groups of Head Start children. One group (N = 117) was composed entirely of Center A children from lower-class homes. This group was divided by median split into high or low Stanford-Binet Intelligence levels. Within each I.Q. level, further subdivisions were made; using a three-way split, children were categorized as having high, moderate or low levels on each of the four Behavior Inventory Summary Scores.

The second group of children (N = 69) differed from the first primarily in that a number of high I.Q., middle-class children enrolled in the Head Start program were included in the original sample. Here, when dividing subjects into high or low I.Q. groups, median splits were not made, but rather approximately one standard deviation above national intelligence test norms was used as the baseline or

starting point for the high I.Q. group. Whereas with the first group of children, high I.Q. began with Binet scores of 90, for the second group it began at 110. For the first group, low I.Q. began at 89; for the second group it began at 87. It was deemed necessary to test the original hypothesis on this second group of children because of the relative absence of truly high I.Q. children in the lower-class group and because of the lack of comparability in range of intelligence test scores between the lower-class group and national norms. Table 4 presents both the number of subjects involved in each behavior level within each I.Q. group as well as the range of scores which each subgroup encompasses.

Finally, for each of these subgroups considered separately, performance on a number of achievement tests and ratings was examined, and, within each I.Q. group, differences in achievement across the behavior levels for each Summary Area were tested for significant interactions. The achievement tests and ratings used in this analysis were: Percentile Score on the Metropolitan Test of Reading and Number Readiness; the five Report Card Summary Scores on School Performance, Verbal Assertion, Responsibility, Independence, and Social Conformity; the three Readiness Checklist items of Kindergarten Readiness, Adaptation, and Achievement, administered to teachers during the fall retest program; and the Preschool Inventory Retest Score, Partial Item Set.

It can be seen from Table 4 that, especially for Sample II, sizes of behavior subgroups within any one I.Q. level were in most cases not of comparable magnitude. Also, when performance on variables chosen as criteria of success is included in these interactions, the

TABLE 4

Composition and Range of Intelligence and Behavior Level Subgroups Constructed for the Prediction of Academic Achievement

| Predictor Variable Subgroups | Range of Summary Scores Included in Level | High I.Q. (Binets of 90+*) Sample I N | Low I.Q. (Binets of 89-) Sample I N | High I.Q. (Binets of 110+) Sample II N | Low I.Q. (Binets of 87-) Sample II N |
|---|---|---|---|---|---|
| Aggression: | | | | | |
| High | 4.0- | 22 | 18 | 5 | 13 |
| Medium | 3.9-6.1 | 24 | 22 | 7 | 14 |
| Low | 6.2+ | 15 | 15 | 16 | 14 |
| Verbal-Social Participation: | | | | | |
| High | 3.7- | 24 | 14 | 15 | 8 |
| Medium | 3.8-5.4 | 23 | 19 | 10 | 16 |
| Low | 5.5+ | 15 | 22 | 4 | 17 |
| Independence: | | | | | |
| High | 3.2- | 21 | 13 | 18 | 10 |
| Medium | 3.3-4.6 | 26 | 16 | 7 | 10 |
| Low | 4.7+ | 15 | 26 | 4 | 21 |
| Achievement-Oriented Beh.: | | | | | |
| High | 5.7+ | 21 | 7 | 18 | 3 |
| Medium | 4.6-5.6 | 29 | 25 | 8 | 20 |
| Low | 4.5- | 11 | 22 | 3 | 17 |

*In this table, plus signs following a number indicate that the subgroup is composed of children with scores at and above the number indicated; minus signs following a number indicate that the subgroup is composed of children with scores at and under the number indicated.

number of subjects is in some cases further diminished due to missing information. Due both to inequality of cell size and to missing information, multivariate analyses of variance, which would have been the most appropriate and desirable tests of significance available, could not be performed.

It was, then, found necessary to measure significance of interactions through the use of t-tests. This, unfortunately, presented new problems due to the interest in looking for either linearity or curvilinearity, as only a limited number of t-tests can be performed in an anlaysis such as this. It was decided to first obtain univariate statistics on the data and then, for each criterion of success in interaction with each of the Behavior Inventory Summary Scores within one I.Q. level, to determine which trend was actually present in the data. In other words, if the success criterion of Reading Readiness was seen to interact in a linear fashion for the high I.Q. group in the subdivisions of level of Aggression, a t-test between the high and low levels was performed. If, on the other hand, a curvilinear trend was apparent, t-tests between the middle and the extreme levels were performed.

It should be mentioned at this point that, in defining linearity in the data, an interaction has been called linear either when a definite linear progression was present or when means in two adjacent cells or in all three cells were equal ($\overline{A}$ $\overline{B}$ $\overline{C}$). An interaction has been called curvilinear when the direction of movement of the first and third means was the same, with the second mean showing directional deviation ($\overline{A}$ $\overline{B}$ $\overline{C}$, or vice versa).

Often these curvilinear deviations were extremely small and did

not approach significance; often, too, cell sizes were too small to allow one to place any great faith in the interactions to which they contributed. This was especially the case with much of the Sample II data, where high I.Q./negative behavior (for example, high I.Q./high Aggression) cells contained only two or three subjects. As large numbers of high I.Q. children have not been available in this study, many of these interactions can only be interpreted as suggestive. Even so, they are highly interesting and will in the future be studied intensively when a more adequate sample can be obtained.

Our initial hypothesis, that differences in behavior level would affect success criteria scores in low I.Q. children more than it would in high I.Q. children, was generally not supported. See Tables 5-8 in the Appendix for information regarding direction and significance of I.Q./Behavior interactions in the prediction of academic achievement.

Looking at those success criteria which either objectively measure achievement (Preschool Inventory Retest scores and Metropolitan Reading Readiness scores) or are ratings of achievement as demonstrated during part of the first year of school (the Readiness Checklist item of Achievement), it is apparent that for the Behavior Inventory Summay Areas of Aggression and Independence, performance of high I.Q. children tended to be significantly handicapped by high levels of Aggression and by low levels of Independence, while scores of low I.Q. children showed little interaction in these behavior areas.

For the Behavior Inventory Summary Areas of Verbal-Social Participation and Achievement-Oriented Behavior, however, some change in

interaction patterns was seen. For the Preschool Inventory, where high levels of Verbal and Achieving behaviors were significantly associated with success in low I.Q. groups, no significant interactions for high I.Q. children appeared. For the success criterion of Reading Readiness, high levels of Verbal behavior significantly influenced scores of high I.Q. children but not those of the low I.Q. groups. Level of Achieving behavior here did not significantly interact with success on Reading Readiness for either I.Q. group.

High ratings of Verbal and Achieving behaviors, observed in interaction with the Readiness Checklist item of Achievement, tended to be significantly associated with success in the high I.Q. groups, but not in the low I.Q. groups.

With the exception, then, of Preschool Inventory Retest scores, which interacted significantly with level of Achieving and Verbal behaviors in low I.Q. groups, it appears that the achievement performance of high I.Q. children suffers more from detrimental behavior patterns than does the performance of their low I.Q. peers, or, rather, that optimal behaviors in low I.Q. children do little to overcome the handicap of low measured intelligence.

Looking now at the Report Card Summary Areas, it should be noted that four of these five success criteria tended largely to provide measures of behavior patterns which are generally felt to play important roles in adjustment to the school environment. Performance of School Tasks, the exception here, is composed of items oriented to actual school achievement.

Success in Performance on School Tasks tended to be associated with high Verbal and Achieving behaviors for high I.Q. children, and

with high independent behaviors for the low I.Q. groups. Level of Aggression showed no significant interactions, and did not seem to interact more with either of the two I.Q. levels.

High Social Conformity, associated with low Aggression, low or moderate Independence, and high Achievement-Oriented Behaviors, interacted little with level of Verbal-Social Participation. Only one significant t-test was obtained for this variable, indicating a significant interaction between Achievement-Oriented Behavior and Social Conformity in the high I.Q. group.

Level of Aggression significantly interacted with Responsibility in low I.Q. groups, but showed no interaction for the high I.Q. groups. Neither Verbal-Social Participation nor Independent behavior interacted significantly with Responsibility, though level of Achievement-Orientation interacted significantly with Responsibility in the high I.Q. groups.

The Report Card Summary Area of Verbal Assertion interacted significantly with level of Independence and Achievement-Orientation for the low I.Q. groups, but not for the high I.Q. samples. It was not significantly associated with level of Aggression or Verbal-Social Participation for either group, though there was a tendency for level of Aggression to affect Verbal Assertion scores more strongly in the low I.Q. children, and for level of Verbal-Social Participation to affect Verbal Assertion scores more in the high I.Q. samples.

The Report Card Summary Area of Independence interacted significantly with Behavior Inventory Summary Areas of Aggression, Independence, and Achievement-Oriented Behavior in the low I.Q. groups, though not in the high I.Q. samples, and showed significant

interaction with level of Verbal-Social Participation in the high I.Q. groups.

To summarize the Report Card Summary Areas of Social Conformity, Responsibility, Verbal Assertion, and Independence, it seems that Social Conformity showed few differences in degree of interaction with Behavior Inventory Summary Areas between the two I.Q. groups. For Responsibility ratings, level of Aggression affected low I.Q. children more than high, and the reverse was true for the behavior area of Achievement-Oriented Behavior. Level of Independence and Achievement-Oriented Behavior was significantly associated with the Report Card Summary Area of Verbal Assertion in low I.Q. children, but Verbal Assertion did not significantly interact with Aggression or Verbal-Social Participation in either I.Q. group. Level of Aggression, Independence, and Achievement-Oriented Behavior interacted significantly with scores on the Report Card Summary Area of Independence for low I.Q. children, and level of Verbal-Social Participation was significantly associated with Independence for the high I.Q. group.

Although it was earlier seen that behavior levels did not significantly affect objectively measured achievement in low I.Q. groups, though significant differences in achievement scores between behavior levels in high I.Q. groups were apparent, these same behavior areas did tend to affect Report Card Summary Area ratings slightly more in low I.Q. groups than in high I.Q. ones, with a greater number of significant *t*-tests appearing for the low I.Q. groups. Behavior patterns in low I.Q. children, then, while they do not significantly affect level of achievement, can be instrumental in facilitating adjustment

to the general school environment, as measured by teachers' ratings. The same, though to a less striking degree, holds true for high I.Q. children, though it must be kept in mind that there was a slight tendency for certain behavior areas to interact more strongly with performance in one I.Q. group that in the other. Aggression and Independence, for example, were behavior areas showing more interaction with Report Card Summary Areas for low I.Q. children than for high; level of Verbal-Social Participation tended to interact slightly more in high I.Q. groups than in low, and level of Achievement-Oriented Behavior interacted to an equal degree with both I.Q. samples.

The Readiness Checklist rating of Adaptation showed little difference in interaction pattern between the two I.Q. groups; high Adaptation was significantly related to low Aggression, high Independence, and high Achievement-Oriented Behavior. It did not interact significantly with level of Verbal-Social Participation, though there was a tendency for low I.Q. levels to interact more than high levels.

The Readiness Checklist rating of Kindergarten Readiness did not interact significantly with Aggression, but did interact significantly with level of Verbal-Social Participation for both I.Q. groups, and with level of independence for the high I.Q. groups. The Kindergarten Readiness rating interacted significantly with the Behavior Inventory Summary Area of Achievement-Oriented Behavior for the low I.Q. groups, though not for the high I.Q. ones.

Turning now to the question of linearity versus curvilinearity, it should be mentioned that no striking curvilinear trends were in evidence, and that no significant *t*-scores would have been obtained had means for the extreme levels been combined and tested for signifi-

cance against means of moderate level groups. In most cases where slight curvilinear trends appeared, the greatest magnitude of difference occurred between the moderate and either one of the two extremes in behavior level, with only minor differences between the moderate and the alternate extreme level. Some pattern in linear or curvilinear tendency was observed, however, for some of the variables. All success criteria (with the exception of one cell) behaved in a linear fashion when observed in interaction with Achievement-Oriented Behavior.

Preschool Inventory and Reading Readiness scores, and the Report Card Summary Area of School Tasks tended either to interact in an unmistakably linear fashion or else provided only weak evidence of curvilinearity.

The Report Card Summary Area of Social Conformity did show curvilinear interactions for the Behavior Inventory Summary Area of Independence, where moderate levels of Independence were consistently associated with highest Conformity ratings. These trends were not significant, but they were consistent.

The Report Card Summary Areas of Responsibility and Independence tended to interact in a linear fashion across all Behavior Inventory Summary Areas, a trend especially marked for the low I.Q. groups. Some evidence of curvilinearity was apparent for the high I.Q. groups, although here Sample II data is open to suspicion because of the lack of an appreciable sample of high I.Q., negative behavior area groups.

The remaining success criteria either showed linear interactions or gave only marginal evidence of curvilinearity. In these latter instances, magnitude of difference across behavior levels was seldom

evenly distributed. Report Card Summary Areas tended to produce minor curvilinear trends for some Behavior Inventory Summary Areas more than did any of the other success criteria, and these trends were restricted largely to the high I.Q. samples, where adequacy of sample is in question.

4. Conclusions

In summary, the majority of success criteria appear to interact in a linear fashion across behavior areas, and what slight indications of curvilinearity do occur appear across high I.Q. groups on a number of the Report Card Summary Areas and across all I.Q. groups on Readiness Checklist items in interaction with the behavior areas of Aggression and Verbal-Social Participation. The majority of curvilinear trends, however, are trends lacking an even distribution of magnitude of difference across the behavior levels, and in most cases the greatest magnitude of difference occurs between moderate levels and one of the two extreme levels, with only minimal differences appearing between moderate behavior levels and the alternate extreme level.

For this Head Start sample, then, few conclusions can be drawn from the results of this study. While the results of the analyses are, with few exceptions, not entirely clear-cut, they are provocative in their implications. As indicated above, there is evidence that on tests or ratings which profess to objectively measure achievement, scores of high I.Q. children seem to be significantly more greatly affected by differences in level of Aggression, Verbal-Social Participation, Independence, and Achievement-Oriented Behavior

than do scores of low I.Q. children. This suggests that handicaps in those performance areas assessed by intelligence tests cannot be effectively mediated through the adoption of optimal behavior patterns. But it has also been seen that behavior patterns of low I.Q. children appear to facilitate or impede general adjustment to the school environment, as measured by teachers' Report Card Ratings, more than do behavior patterns of high I.Q. children, especially in Behavior Inventory Summary Areas of Aggression and Independence. Optimal adjustment to the school environment in these low I.Q. children might eventually facilitate effective contact with the types of intellectual stimulation afforded by the school, and this in turn might, over time, lead to significantly greater achievement on objective tests. It is unfortunate that the follow-up program was limited to only the first half of the first year in school.

## References


Bandura, A., and Walters, R. Aggression. In H. Stevenson (Ed.), Sixty-second yearbook of the national society for the study of education, part I, child psychology. Chicago, Illinois: The University of Chicago Press, 1963. Pp. 364-415.

Beller, E.K. Dependency and independence in young children. Journal of Genetic Psychology, 1955, 87, 23-35.

Bronfenbrenner, U. The appraisal of personality characteristics in children. In P. Mussen (Ed.), Handbook of research methods in child development. New York: Wiley, 1960. Pp. 770-820.

Caldwell, B.M. The preschool inventory manual. Unpublished manuscript. Syracuse, New York: State University of New York, 1965.

Caldwell, B.M., and Soule, D. The preschool inventory. Unpublished manuscript. Syracuse, New York: Children's Center, Department of Pediatrics, Upstate Medical Center, 1966.

Crandall, V. J., Achievement. In H. Stevenson (Ed.), Sixty-second yearbook of the national society for the study of education, part I, child psychology. Chicago, Illinois: The University of Chicago Press, 1963. Pp. 416-460.

Crandall, V.J., Katkovsky, W., and Preston, A. Motivational and ability determinants of young children's intellectual achievement behaviors. Child Development, 1962, 33, 643-661.

Crandall, V.J., and Sinkeldam, C. Children's dependent and achievement behaviors in social situations and their perceptual field dependence. Journal of Personality, 1964, 32, 1-22.

Emmerich, W. Continuity and stability in early social development. II: Teacher ratings. Child Development, 1966, 37, 17-27.

Heathers, G. Acquiring dependence and independence: a theoretical orientation. Journal of Genetic Psychology, 1955, 87, 277-291.

Hess, R.D., Kramer, R., Slaughter, D., Torney, J., Berry, C., and Hull, E. Techniques for assessing cognitive and social abilities of children and parents in project head start. Report on Research Contract OEO-519 with the U.S. Office of Economic Opportunity, University of Chicago, 1966.

Hinkelman, E. Relationship of intelligence to elementary school achievement. Educational Administration Supervision, 1955, 41, 176-179.

Kennedy, U.A., Van de Reit, V.E., and White, J.C. A normative sample of intelligence and achievement of Negro elementary school children in the southeastern United States. Monographs of the Society for Research in Child Development, 1963, 28.

Knief, L.M., and Stroud, J.B. Intercorrelations among various intelligence, achievement, and social class scores. Journal of Educational Psychology, 1959, 50, 117-120.

Lavin, D.E. The prediction of academic performance. New York: Russell Sage Foundation, 1965.

McClelland, D.L. Issues in the identification of talent. In D.L. McClelland (Ed.), Talent and society. Princeton, New Jersey: D. Van Nostrand Co., 1958.

McClelland, D.L., Atkinson, J., Clark, R., and Lowell, E. The achievement motive. New York: Appleton-Century-Crofts, Inc., 1953.

Rosen, B. The achievement syndrome. American Sociological Review, 1956, 21, 203-211.

Stott, L.H., and Ball, R.S. Infant and preschool mental tests: review and evaluation. Monographs of the Society for Research in Child Development, 1965, 39.

Sundberg, N. Clinical assessment problems and procedures: a national survey. American Psychologist, 1960, 15, 404-411.

Terman, L.M., and Oden, M.H. The gifted child grows up. Stanford: Stanford University Press, 1947.

Thorndike, R.L. The concepts of over- and underachievement. Bureau of Publications, Teachers College, New York: Columbia University Press, 1963. Pp. 1-15.

Torney, J., Hull, E.I., and Hess, R.D. The prediction of early school achievement in working class and culturally disadvantaged children. Paper presented at the Conference of the Society for Research in Child Development, March 30, 1967, New York.

# APPENDIX TO RESEARCH REPORT D

## ADDITIONAL TABLES

TABLE 2

Correlations of Selected Variables from Summer Head Start Testing with Six Criteria of Performance in Kindergarten+

| Summer Head Start Variables | Summary Scores from Report Cards: Percentile score Met. Read/Num Readiness | Perform. School Task | Social Conform. | Verbal Assert. | Respon-sibility | Indepen-dence |
|---|---|---|---|---|---|---|
| **Cognitive Variables** | | | | | | |
| Stanford-Binet IQ | .68** (97) | .69** (70) | .34** (81) | .67** (75) | .51** (79) | .58** (80) |
| Preschool Inventory (1, Partial Score) | .69** (89) | .75** (66) | .32** (76) | .71** (71) | .54** (74) | .59** (75) |
| D-A-M IQ (Wk 4) | .40** (98) | .40** (73) | .22* (84) | .54** (78) | .31** (82) | .36** (83) |
| **Ratings by Head Start Teachers** | | | | | | |
| Prob. Adapt. Kgtn. | .51** (96) | .43** (71) | .36** (82) | .49** (76) | .46** (80) | .47** (81) |
| Prob. Achieve. Kgtn. | .54** (97) | .47** (69) | .31** (80) | .58** (74) | .41** (78) | .50** (79) |
| Beh. I.- Aggress. Time 1 | -.27** (97) | -.16 (73) | -.33** (84) | -.15 (78) | -.39** (82) | -.28* (83) |
| Beh. I.- Aggress. Time 2 | -.18 (98) | -.17 (73) | -.30** (84) | -.24* (78) | -.41** (82) | -.30** (83) |
| Beh. I. - Verb/ Soc. Time 1 | .28** (98) | .26* (73) | .24* (84) | .41** (78) | .19 (82) | .15 (83) |
| Beh. I. - Verb/ Soc. Time 2 | .28** (98) | .29** (73) | .26* (84) | .42** (78) | .26* (82) | .12 (83) |
| Beh. I. - Indep. Time 1 | .28** (98) | .15 (73) | .05 (84) | .25* (78) | .16 (82) | .33** (83) |
| Beh. I. - Indep. Time 2 | .29** (98) | .25* (73) | .14 (84) | .30** (78) | .27* (82) | .39** (83) |

Table 2 - continued

| Summer Head Start Variables | Summary Scores from Report Cards: Percentile score Met. Read/Num Readiness | Perform. School Task | Social Conform. | Verbal Assert. | Respon-sibility | Indepen-dence |
|---|---|---|---|---|---|---|
| **Ratings by Head Start Teachers** | | | | | | |
| Beh. I. - Achieve. Time 1 | .35** (96) | .36** (71) | .31** (82) | .48** (76) | .34** (80) | .35** (81) |
| Beh. I. - Achieve. Time 2 | .34** (97) | .36** (72) | .26* (83) | .40** (77) | .37** (81) | .38** (82) |
| **Ratings by Observers** | | | | | | |
| Prob. Adapt. Kgtn. | .39** (74) | .50** (56) | .28* (65) | .55** (60) | .31* (63) | .41** (64) |
| Prob. Achieve. Kgtn. | .47** (74) | .61** (56) | .32** (65) | .58** (60) | .37** (63) | .53** (64) |
| Beh. I. - Aggress. Time 1 | -.09 (97) | -.22 (71) | -.19 (82) | -.17 (76) | -.43** (80) | -.22* (81) |
| Beh. I. - Verb/ Soc. Time 1 | .20* (97) | .33* (72) | .03 (83) | .29* (77) | .10 (81) | .04 (82) |
| Beh. I. - Indep. Time 1 | .15 (97) | .12 (72) | .15 (83) | .17 (77) | .20 (81) | .24 (82) |
| Beh. I. - Achieve. Time 1 | .27** (97) | .35** (72) | .30** (83) | .31** (77) | .29** (81) | .32** (74) |

+Correlations based on Center A, working-class children only. Signs have been changed in this table so that high scores indicate a high amount of the quality named.

*$p \leq .05$; **$p \leq .01$

TABLE 5

The Interaction of the Behavior Summary Score of Aggression with IQ in the Prediction of Academic Achievement+

| | Low IQ Group (Stanford-Binet, Form LM) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | High Aggression | | | Medium Aggression | | | Low Aggression | | | |
| Success Criteria | $\bar{X}$ | N | high/medium t | $\bar{X}$ | N | low/medium t | $\bar{X}$ | N | high/low t | Trend (L = Linear; C = Curvilinear) |
| 1. Caldwell Retest | | | | | | | | | | |
| Sample I | 27.50 | 14 | -.066 | 27.63 | 16 | -.654 | 26.45 | 11 | | C |
| Sample II | 26.67 | 9 | .203 | 26.20 | 10 | .138 | 26.45 | 11 | --- | C |
| 2. Reading Readiness | | | | | | | | | | |
| Sample I | 11.47 | 15 | --- | 13.78 | 18 | --- | 14.38 | 13 | .921 | L |
| Sample II | 12.18 | 11 | -.666 | 15.50 | 12 | -.232 | 14.38 | 13 | --- | C |
| 3. School Tasks | | | | | | | | | | |
| Sample I | 13.50 | 10 | --- | 15.10 | 10 | --- | 15.30 | 10 | 1.11 | L |
| Sample II | 13.87 | 8 | -.937 | 15.75 | 8 | -.226 | 15.30 | 10 | -- | C |
| 4. Social Conformity | | | | | | | | | | |
| Sample I | 16.83 | 12 | --- | 23.00 | 15 | --- | 23.09 | 11 | 2.55* | L |
| Sample II | 15.50 | 10 | -3.43** | 24.09 | 11 | -.410 | 23.09 | 11 | --- | C |
| 5. Responsibility | | | | | | | | | | |
| Sample I | 13.64 | 11 | --- | 17.43 | 14 | --- | 20.18 | 11 | 4.15** | L |
| Sample II | 13.00 | 10 | --- | 17.80 | 10 | --- | 20.18 | 11 | 4.72** | L |
| 6. Verbal Assertion | | | | | | | | | | |
| Sample I | 15.00 | 10 | --- | 15.84 | 13 | --- | 16.91 | 11 | 1.45 | L |
| Sample II | 14.44 | 9 | --- | 16.00 | 10 | --- | 16.91 | 11 | 1.93 | L |
| 7. Independence | | | | | | | | | | |
| Sample I | 15.27 | 11 | --- | 18.27 | 15 | --- | 19.27 | 11 | 1.97 | L |
| Sample II | 14.60 | 10 | --- | 18.00 | 11 | --- | 19.27 | 11 | 2.32* | L |

Table 5 - continued

| Success Criteria | High Aggression $\bar{X}$ | N | high/medium t | Medium Aggression $\bar{X}$ | N | low/medium t | Low Aggression $\bar{X}$ | N | high/low t | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Low IQ Group** | | | | | | | | | | |
| 8. Kgtn. Readiness Retest | | | | | | | | | | |
| Sample I | 3.29 | 14 | --- | 3.19 | 16 | --- | 3.09 | 11 | -.583 | L |
| Sample II | 3.33 | 9 | -.348 | 3.50 | 10 | -1.11 | 3.09 | 11 | --- | C |
| 9. Adaptation Retest | | | | | | | | | | |
| Sample I | 4.79 | 14 | -.053 | 4.81 | 16 | -1.55 | 4.09 | 11 | --- | C |
| Sample II | 5.22 | 9 | --- | 5.10 | 10 | --- | 4.09 | 11 | -2.63* | L |
| 10. Achievement Retest | | | | | | | | | | |
| Sample I | 4.57 | 14 | -.805 | 5.00 | 15 | -.879 | 4.55 | 11 | --- | C |
| Sample II | 4.67 | 9 | -.750 | 5.22 | 9 | -1.12 | 4.55 | 11 | --- | C |
| **High IQ Group** | | | | | | | | | | |
| 1. Caldwell Retest | | | | | | | | | | |
| Sample I | 34.50 | 8 | .499 | 33.35 | 17 | -2.09* | 36.62 | 21 | --- | C |
| Sample II | --- | - | --- | --- | - | --- | --- | - | --- | - |
| 2. Reading Readiness | | | | | | | | | | |
| Sample I | 20.27 | 11 | --- | 28.86 | 21 | --- | 43.16 | 19 | 2.71* | L |
| Sample II | 58.67 | 3 | --- | 60.50 | 4 | --- | 61.29 | 14 | .160 | L |
| 3. School Tasks | | | | | | | | | | |
| Sample I | 22.57 | 7 | -.317 | 23.43 | 14 | .218 | 23.00 | 19 | --- | C |
| Sample II | 25.53 | 3 | -1.24 | 30.00 | 2 | -1.42 | 25.50 | 10 | --- | C |

Table 5 - continued

| Success Criteria | High IQ Group: High Aggression $\bar{X}$ | N | high/medium t | Medium Aggression $\bar{X}$ | N | low/medium t | Low Aggression $\bar{X}$ | N | high/low t | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| 4. Social Conformity | | | | | | | | | | |
| Sample I | 22.00 | 7 | --- | 24.06 | 17 | --- | 26.21 | 19 | 1.92 | L |
| Sample II | 21.33 | 3 | 10.07** | 30.00 | 2 | -.927 | 27.62 | 13 | --- | C |
| 5. Responsibility | | | | | | | | | | |
| Sample I | 19.14 | 7 | --- | 21.29 | 17 | --- | 24.21 | 19 | 2.03 | L |
| Sample II | 22.67 | 3 | -4.26* | 30.00 | 2 | -1.42 | 25.54 | 13 | --- | C |
| 6. Verbal Assertion | | | | | | | | | | |
| Sample I | 22.57 | 7 | .560 | 21.20 | 15 | -.809 | 22.74 | 19 | --- | C |
| Sample II | 24.67 | 3 | -.939 | 29.00 | 2 | -1.09 | 25.64 | 11 | --- | C |
| 7. Independence | | | | | | | | | | |
| Sample I | 23.71 | 7 | .252 | 23.06 | 17 | -.987 | 24.95 | 19 | --- | C |
| Sample II | 24.66 | 3 | -2.31 | 29.00 | 2 | -.794 | 26.00 | 13 | --- | C |
| 8. Kgtn. Readiness Retest | | | | | | | | | | |
| Sample I | 2.50 | 8 | -.070 | 2.53 | 17 | -2.04* | 1.95 | 21 | --- | C |
| Sample II | --- | -- | --- | --- | -- | --- | --- | -- | --- | - |
| 9. Adaptation Retest | | | | | | | | | | |
| Sample I | 3.50 | 8 | --- | 3.29 | 17 | --- | 2.24 | 21 | -3.11** | L |
| Sample II | --- | -- | --- | --- | -- | --- | --- | -- | --- | - |
| 10. Achievement Retest | | | | | | | | | | |
| Sample I | 3.38 | 8 | -.145 | 3.47 | 17 | -1.86 | 2.57 | 21 | --- | C |
| Sample II | --- | -- | --- | --- | -- | --- | --- | -- | --- | - |

*p .05; **p .01, two-tailed test

+Sample I contains working class children only; Sample II contains high-IQ, middle-class subjects as well as working-class ones. High scores on Report Card Summary Areas (Success Criteria 3-7) indicate high amounts of qualities named. High scores on Kindergarten Readiness, Adaptation, and Achievement indicate low amounts of the qualities named.

TABLE 6

The Interaction of the Behavior Inventory Summary Score of Verbal-Social Participation with Intelligence in the Prediction of Academic Achievement+

| Success Criteria | Low IQ Group: High Verbal $\bar{X}$ | N | high/medium t | Medium Verbal $\bar{X}$ | N | low/medium t | Low Verbal $\bar{X}$ | N | high/low t | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Caldwell Retest | | | | | | | | | | |
| Sample I | 31.60 | 10 | 4.12** | 25.43 | 14 | .509 | 26.24 | 17 | --- | C |
| Sample II | 32.00 | 5 | --- | 25.55 | 11 | --- | 25.14 | 14 | -3.22** | L |
| 2. Reading Readiness | | | | | | | | | | |
| Sample I | 14.31 | 13 | -.192 | 15.12 | 17 | -1.39 | 10.25 | 16 | --- | C |
| Sample II | 16.75 | 8 | --- | 16.43 | 14 | --- | 10.21 | 14 | -1.88 | L |
| 3. School Tasks | | | | | | | | | | |
| Sample I | 13.60 | 5 | --- | 13.64 | 11 | --- | 15.79 | 14 | .999 | L |
| Sample II | 15.33 | 3 | .764 | 13.80 | 10 | 1.20 | 15.85 | 13 | --- | C |
| 4. Social Conformity | | | | | | | | | | |
| Sample I | 21.80 | 10 | .462 | 20.42 | 12 | .282 | 21.13 | 16 | --- | C |
| Sample II | 22.29 | 7 | .536 | 20.45 | 11 | .177 | 20.93 | 14 | --- | C |
| 5. Responsibility | | | | | | | | | | |
| Sample I | 16.44 | 9 | --- | 17.27 | 11 | --- | 17.38 | 16 | .398 | L |
| Sample II | 16.33 | 6 | --- | 17.27 | 11 | --- | 17.29 | 14 | .342 | L |
| 6. Verbal Assertion | | | | | | | | | | |
| Sample I | 17.00 | 8 | .901 | 15.40 | 10 | .307 | 15.75 | 16 | --- | C |
| Sample II | 17.67 | 6 | 1.28 | 15.40 | 10 | .024 | 15.43 | 14 | --- | C |
| 7. Independence | | | | | | | | | | |
| Sample I | 16.60 | 10 | --- | 16.73 | 11 | --- | 19.00 | 16 | .992 | L |
| Sample II | 16.57 | 7 | --- | 16.73 | 11 | --- | 18.29 | 14 | .628 | L |
| 8. Kgtn. Readiness Retest | | | | | | | | | | |
| Sample I | 2.80 | 10 | -2.12* | 3.57 | 14 | 1.35 | 3.12 | 17 | --- | C |
| Sample II | 3.00 | 5 | -1.28 | 3.55 | 11 | -.954 | 3.21 | 14 | --- | C |

Table 6 - continued

Low IQ Group

| Success Criteria | High Verbal $\bar{X}$ | N | high/medium t | Medium Verbal $\bar{X}$ | N | low/medium t | Low Verbal $\bar{X}$ | N | high/low t | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| 9. Adaptation Retest | | | | | | | | | | |
| Sample I | 4.10 | 10 | --- | 4.43 | 14 | --- | 5.06 | 17 | 1.91 | L |
| Sample II | 4.20 | 5 | --- | 4.55 | 11 | --- | 5.14 | 14 | 1.35 | L |
| 10. Achievement Retest | | | | | | | | | | |
| Sample I | 4.90 | 10 | .532 | 4.62 | 13 | .183 | 4.71 | 17 | --- | C |
| Sample II | 5.20 | 5 | .688 | 4.70 | 10 | .025 | 4.71 | 14 | --- | C |

High IQ Group

| Success Criteria | High Verbal $\bar{X}$ | N | high/medium t | Medium Verbal $\bar{X}$ | N | low/medium t | Low Verbal $\bar{X}$ | N | high/low t | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Caldwell Retest | | | | | | | | | | |
| Sample I | 35.73 | 15 | --- | 35.42 | 19 | --- | 33.58 | 12 | -1.18 | L |
| Sample II | 41.00 | 5 | --- | 41.00 | 6 | --- | 35.33 | 3 | -3.14* | L |
| 2. Reading Readiness | | | | | | | | | | |
| Sample I | 37.25 | 20 | --- | 31.50 | 20 | --- | 29.08 | 12 | -.864 | L |
| Sample II | 69.62 | 13 | --- | 59.00 | 6 | --- | 30.67 | 3 | -2.91* | |
| 3. School Tasks | | | | | | | | | | |
| Sample I | 23.79 | 14 | --- | 23.58 | 17 | --- | 21.00 | 9 | -1.07 | L |
| Sample II | 27.33 | 9 | --- | 25.75 | 4 | --- | 21.00 | 2 | -1.96 | L |
| 4. Social Conformity | | | | | | | | | | |
| Sample I | 25.00 | 14 | --- | 24.65 | 17 | --- | 24.33 | 12 | -.317 | L |
| Sample II | 26.90 | 10 | -.740 | 28.40 | 5 | -1.68 | 24.00 | 3 | --- | C |
| 5. Responsibility | | | | | | | | | | |
| Sample I | 23.29 | 14 | --- | 21.76 | 17 | --- | 21.67 | 12 | -.624 | L |
| Sample II | 26.40 | 10 | --- | 26.00 | 5 | --- | 22.00 | 3 | -1.81 | L |

Table 6 - continued

| Success Criteria | High IQ Group: High Verbal $\bar{X}$ | N | high/medium t | Medium Verbal $\bar{X}$ | N | low/medium t | Low Verbal $\bar{X}$ | N | high/low t | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| 6. Verbal Assertion | | | | | | | | | | |
| Sample I | 23.43 | 14 | --- | 22.47 | 17 | --- | 19.80 | 10 | -1.45 | L |
| Sample II | 26.67 | 9 | --- | 26.00 | 4 | --- | 23.33 | 3 | -1.05 | L |
| 7. Independence | | | | | | | | | | |
| Sample I | 25.00 | 14 | --- | 23.76 | 17 | --- | 23.17 | 12 | -.832 | L |
| Sample II | 24.80 | 10 | -1.96 | 29.60 | 5 | -4.44* | 24.67 | 3 | --- | C |
| 8. Kgtn. Readiness Retest | | | | | | | | | | |
| Sample I | 1.87 | 15 | -2.27* | 2.58 | 19 | -1.05 | 2.25 | 12 | --- | C |
| Sample II | 1.80 | 5 | .380 | 2.00 | 6 | -1.15 | 1.33 | 3 | --- | C |
| 9. Adaptation Retest | | | | | | | | | | |
| Sample I | 2.47 | 15 | -1.55 | 3.11 | 19 | -.432 | 2.92 | 12 | --- | C |
| Sample II | 2.80 | 5 | --- | 2.67 | 6 | --- | 2.67 | 3 | -.122 | L |
| 10. Achievement Retest | | | | | | | | | | |
| Sample I | 2.67 | 15 | --- | 3.16 | 19 | --- | 3.33 | 12 | 1.13 | L |
| Sample II | 3.20 | 5 | .704 | 2.50 | 6 | 1.53 | 3.33 | 3 | --- | C |

*p .05; **p .01, two-tailed test

+Sample I contains working-class children only; Sample II contains high-IQ, middle-class subjects as well as working-class ones. High scores on Report Card Summary Scores (Success Criteria 3-7) indicate high amounts of the qualities named. High scores on Kindergarten Readiness, Adaptation, and Achievement indicate low amounts of the qualities named.

Table 7

The Interaction of the Behavior Inventory Summary Score of Independence with Intelligence in the Prediction of Academic Achievement+

| Success Criteria | Low IQ Group: High Independence $\bar{X}$ | N | high/medium t | Medium Independence $\bar{X}$ | N | low/medium t | Low Independence $\bar{X}$ | N | high/low t | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Caldwell Retest | | | | | | | | | | |
| Sample I | 29.17 | 12 | --- | 27.63 | 11 | --- | 25.78 | 18 | -1.85 | L |
| Sample II | 28.22 | 9 | --- | 26.00 | 7 | --- | 25.50 | 14 | -1.33 | L |
| 2. Reading Readiness | | | | | | | | | | |
| Sample I | 15.92 | 12 | 1.52 | 10.77 | 13 | .662 | 13.14 | 21 | --- | C |
| Sample II | 16.60 | 10 | 1.21 | 11.22 | 9 | .612 | 14.12 | 17 | --- | C |
| 3. School Tasks | | | | | | | | | | |
| Sample I | 16.50 | 10 | 2.26* | 12.57 | 7 | 1.14 | 14.31 | 13 | --- | C |
| Sample II | 16.50 | 10 | 2.11 | 12.20 | 5 | 1.51 | 14.91 | 11 | --- | C |
| 4. Social Conformity | | | | | | | | | | |
| Sample I | 21.36 | 11 | -.236 | 22.10 | 10 | -.629 | 20.29 | 17 | --- | C |
| Sample II | 20.50 | 10 | -.555 | 22.38 | 8 | -.507 | 20.71 | 14 | --- | C |
| 5. Responsibility | | | | | | | | | | |
| Sample I | 19.40 | 10 | --- | 16.40 | 10 | --- | 16.13 | 16 | -1.71 | L |
| Sample II | 18.89 | 9 | --- | 16.50 | 8 | --- | 16.29 | 14 | -1.30 | L |
| 6. Verbal Assertion | | | | | | | | | | |
| Sample I | 16.73 | 11 | -.249 | 17.11 | 9 | -2.13* | 14.57 | 14 | --- | C |
| Sample II | 16.60 | 10 | --- | 16.57 | 7 | --- | 14.92 | 13 | -1.27 | L |
| 7. Independence | | | | | | | | | | |
| Sample I | 20.55 | 11 | --- | 18.60 | 10 | --- | 15.15 | 16 | -2.86** | L |
| Sample II | 19.60 | 10 | --- | 18.25 | 8 | --- | 15.15 | 14 | -2.30* | L |

Table 7 - continued

| Success Criteria | High Independence $\bar{X}$ | N | high/medium t | Medium Independence $\bar{X}$ | N | low/medium t | Low Independence $\bar{X}$ | N | high/low t | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Low IQ Group** | | | | | | | | | | |
| 8. Kgtn. Readiness Retest | | | | | | | | | | |
| Sample I | 2.83 | 12 | --- | 3.09 | 11 | --- | 3.50 | 18 | 1.93 | L |
| Sample II | 3.00 | 9 | --- | 3.29 | 7 | --- | 3.50 | 14 | 1.28 | L |
| 9. Adaptation Retest | | | | | | | | | | |
| Sample I | 4.33 | 12 | --- | 4.64 | 11 | --- | 4.78 | 18 | .913 | L |
| Sample II | 4.56 | 9 | --- | 4.86 | 7 | --- | 4.86 | 14 | .512 | L |
| 10. Achievement Retest | | | | | | | | | | |
| Sample I | 4.33 | 12 | --- | 4.82 | 11 | ---- | 4.94 | 17 | 1.24 | L |
| Sample II | 4.44 | 9 | --- | 4.71 | 7 | --- | 5.08 | 13 | 1.07 | L |
| **High IQ Group** | | | | | | | | | | |
| 1. Caldwell Retest | | | | | | | | | | |
| Sample I | 37.17 | 18 | 2.61* | 33.40 | 20 | .471 | 34.37 | 8 | --- | C |
| Sample II | 41.00 | 8 | 1.28 | 37.75 | 4 | .260 | 39.00 | 2 | --- | C |
| 2. Reading Readiness | | | | | | | | | | |
| Sample I | 45.39 | 18 | --- | 28.59 | 22 | --- | 23.17 | 12 | -2.63* | L |
| Sample II | 66.69 | 16 | --- | 53.75 | 4 | --- | 34.50 | 2 | -2.06 | L |
| 3. School Tasks | | | | | | | | | | |
| Sample I | 24.28 | 14 | 1.36 | 21.79 | 19 | .953 | 24.14 | 7 | --- | C |
| Sample II | --- | -- | --- | --- | -- | --- | --- | -- | --- | - |
| 4. Social Conformity | | | | | | | | | | |
| Sample I | 24.21 | 14 | --- | 24.40 | 20 | --- | 26.00 | 9 | .730 | L |
| Sample II | 26.75 | 12 | .519 | 25.50 | 4 | 1.14 | 30.00 | 2 | --- | C |

Table 7 - continued

| Success Criteria | High Independence $\bar{X}$ | N | high/medium t | Medium Independence $\bar{X}$ | N | low/medium t | Low Independence $\bar{X}$ | N | high/low t | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | High IQ Group | | | | | | |
| 5. Responsibility | | | | | | | | | | |
| Sample I | 22.71 | 14 | .744 | 21.00 | 20 | 1.30 | 24.22 | 9 | --- | C |
| Sample II | 25.33 | 12 | .131 | 25.00 | 4 | .667 | 28.00 | 2 | --- | C |
| 6. Verbal Assertion | | | | | | | | | | |
| Sample I | 23.86 | 14 | 1.45 | 21.16 | 19 | .158 | 21.50 | 8 | --- | C |
| Sample II | 26.00 | 10 | --- | 26.00 | 4 | --- | 25.00 | 2 | -.258 | L |
| 7. Independence | | | | | | | | | | |
| Sample I | 26.00 | 14 | 1.89 | 22.30 | 20 | 1.07 | 24.67 | 9 | --- | C |
| Sample II | 25.63 | 12 | --- | 26.50 | 4 | --- | 27.00 | 2 | .297 | L |
| 8. Kgtn. Readiness Retest | | | | | | | | | | |
| Sample I | 1.89 | 18 | -2.46* | 2.60 | 20 | -.903 | 2.25 | 8 | --- | C |
| Sample II | 1.75 | 8 | --- | 1.75 | 4 | --- | 2.00 | 2 | .381 | L |
| 9. Adaptation Retest | | | | | | | | | | |
| Sample I | 2.28 | 18 | --- | 3.10 | 20 | --- | 3.50 | 8 | 2.78* | L |
| Sample II | 2.62 | 8 | 1.67 | 2.50 | 4 | 1.89 | 3.50 | 2 | --- | C |
| 10. Achievement Retest | | | | | | | | | | |
| Sample I | 2.33 | 18 | --- | 3.30 | 20 | --- | 4.00 | 8 | 3.20** | L |
| Sample II | 2.50 | 8 | --- | 3.00 | 4 | --- | 4.50 | 2 | 1.58 | L |

*p .05; **p .01, two-tailed test

+Sample I contains working-class children only; Sample II contains high-IQ, middle-class subjects as well as working-class ones. High scores on Report Card Summary Scores (Success Criteria 3-7) indicate high amounts of the qualities named. High scores on Kindergarten Readiness, Adaptation, and Achievement indicate low amounts of the qualities named.

Table 8

Interaction of the Behavior Inventory Summary Score of Achievement-Oriented Behavior with Intelligence in the Prediction of Academic Achievement+

| Success Criteria | Low IQ Group: High Achiev.-Orient. $\bar{X}$ | N | high/medium t | Medium Achieve.-Orient. $\bar{X}$ | N | low/medium t | Low Achieve.-Orient. $\bar{X}$ | N | high/low t | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Caldwell Retest | | | | | | | | | | |
| Sample I | 34.33 | 6 | | 27.22 | 18 | | 24.44 | 16 | -5.53** | L |
| Sample II | 35.50 | 2 | | 27.25 | 16 | | 23.18 | 11 | -6.09** | L |
| 2. Reading Readiness | | | | | | | | | | |
| Sample I | 17.43 | 7 | | 13.60 | 20 | | 11.39 | 18 | -1.28 | L |
| Sample II | 25.33 | 3 | | 14.11 | 18 | | 12.07 | 14 | -1.74 | L |
| 3. School Tasks | | | | | | | | | | |
| Sample I | 15.50 | 4 | | 14.92 | 13 | | 13.83 | 12 | -.938 | L |
| Sample II | 16.67 | 3 | | 15.33 | 12 | | 13.90 | 10 | -1.32 | L |
| 4. Social Conformity | | | | | | | | | | |
| Sample I | 24.83 | 6 | | 20.67 | 18 | | 20.00 | 13 | -1.62 | L |
| Sample II | 22.33 | 3 | | 21.29 | 17 | | 20.45 | 11 | -.428 | L |
| 5. Responsibility | | | | | | | | | | |
| Sample I | 20.67 | 6 | | 16.82 | 17 | | 15.83 | 12 | -2.11 | L |
| Sample II | 20.00 | 3 | | 17.25 | 16 | | 16.18 | 11 | -1.16 | L |
| 6. Verbal Assertion | | | | | | | | | | |
| Sample I | 19.60 | 5 | 2.78* | 15.18 | 17 | -.084 | 15.27 | 11 | | C |
| Sample II | 20.00 | 3 | | 15.50 | 16 | | 15.00 | 10 | -2.66* | L |
| 7. Independence | | | | | | | | | | |
| Sample I | 26.67 | 6 | | 16.89 | 18 | | 16.67 | 12 | -2.33* | L |
| Sample II | 22.00 | 3 | | 17.29 | 17 | | 16.55 | 11 | -1.56 | L |

Table 8 - continued

Low IQ Group

| Success Criteria | High Achieve.-Orient. | | high/medium | Medium Achieve.-Orient. | | low/medium | Low Achieve.-Orient. | | high/low | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| | $\bar{X}$ | N | t | $\bar{X}$ | N | t | $\bar{X}$ | N | t | |
| 8. Kgtn. Readiness Retest | | | | | | | | | | |
| Sample I | 2.17 | 6 | | 3.11 | 18 | | 3.63 | 16 | 3.57** | L |
| Sample II | 3.00 | 2 | | 3.13 | 16 | | 3.55 | 11 | .907 | L |
| 9. Adaptation Retest | | | | | | | | | | |
| Sample I | 3.50 | 6 | | 4.50 | 18 | | 5.13 | 16 | 2.63* | L |
| Sample II | 3.50 | 2 | | 4.56 | 16 | | 5.27 | 11 | 1.61 | L |
| 10. Achievement Retest | | | | | | | | | | |
| Sample I | 4.00 | 6 | | 4.65 | 17 | | 5.06 | 16 | 1.85 | L |
| Sample II | 3.50 | 2 | | 4.73 | 15 | | 5.09 | 11 | 1.75 | L |

High IQ Group

| Success Criteria | High Achieve.-Orient. | | high/medium | Medium Achieve.-Orient. | | low/medium | Low Achieve.-Orient. | | high/low | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| | X | N | t | X | N | t | X | N | t | |
| 1. Caldwell Retest | | | | | | | | | | |
| Sample I | 36.89 | 18 | | 33.86 | 22 | | 33.20 | 5 | -1.42 | L |
| Sample II | --- | -- | | --- | -- | | --- | -- | --- | - |
| 2. Reading Readiness | | | | | | | | | | |
| Sample I | 41.32 | 19 | | 28.59 | 27 | | 22.00 | 5 | -1.48 | L |
| Sample II | --- | -- | | --- | -- | | --- | -- | --- | - |
| 3. School Tasks | | | | | | | | | | |
| Sample I | 24.53 | 15 | | 22.16 | 19 | | 20.80 | 5 | -1.17 | L |
| Sample II | --- | -- | | --- | -- | | --- | -- | --- | - |
| 4. Social Conformity | | | | | | | | | | |
| Sample I | 26.33 | 15 | | 24.55 | 20 | | 20.71 | 7 | -2.58* | L |
| Sample II | --- | -- | | --- | -- | | --- | -- | --- | - |

Table 8 - continued

| Success Criteria | High Achieve.-Orient. $\bar{X}$ | N | High IQ Group: high/medium ± | Medium Achieve.-Orient $\bar{X}$ | N | low/medium ± | Low Achieve.-Orient. $\bar{X}$ | N | high/low ± | Trend (L = Linear; C = Curvilinear) |
|---|---|---|---|---|---|---|---|---|---|---|
| 5. Responsibility | | | | | | | | | | |
| Sample I | 24.00 | 15 | | 21.90 | 20 | | 18.29 | 7 | -2.21* | L |
| Sample II | --- | -- | | --- | -- | | --- | -- | --- | - |
| 6. Verbal Assertion | | | | | | | | | | |
| Sample I | 24.93 | 15 | | 21.16 | 19 | | 17.33 | 6 | -3.12** | L |
| Sample II | --- | -- | | --- | -- | | --- | -- | --- | - |
| 7. Independence | | | | | | | | | | |
| Sample I | 25.73 | 15 | | 23.10 | 20 | | 22.00 | 7 | -1.53 | L |
| Sample II | --- | -- | | --- | -- | | --- | -- | --- | - |
| 8. Kgtn. Readiness Retest | | | | | | | | | | |
| Sample I | 2.06 | 18 | | 2.32 | 22 | | 2.40 | 5 | .696 | L |
| Sample II | --- | -- | | --- | -- | | --- | -- | --- | - |
| 9. Adaptation Retest | | | | | | | | | | |
| Sample I | 2.22 | 18 | | 3.18 | 22 | | 3.80 | 5 | 2.62* | L |
| Sample II | --- | -- | | --- | -- | | --- | -- | --- | - |
| 10. Achievement Retest | | | | | | | | | | |
| Sample I | 2.22 | 18 | | 3.45 | 22 | | 4.40 | 5 | 3.19** | L |
| Sample II | --- | -- | | --- | -- | | --- | -- | --- | - |

*p $\leq$ .05; **p $\leq$ .01, two-tailed test

+Sample I contains working-class children only; Sample II contains high-IQ, middle-class subjects as well as working-class ones. In the high-IQ group, there were no low achievers in Sample II, and so no data is available for this group. High Scores on Report Card Summary Scores (Success Criteria 3-7) indicate high amounts of the qualities named. High Scores on Kindergarten Readiness, Adaptation, and Achievement indicate low amounts of the qualities named.